

CALENDAR

OF SELECTED TELECOMMUNICATIONS COURSES
from classes scheduled for May/June, 1981

DIGITAL TRANSMISSION SYSTEMS ENGINEERING
(Course No. 535)

May 11-15

DIGITAL SIGNAL DETECTION AND ESTIMATION
(Course No. 821)

May 18-22

DIGITAL ENCODING AND PROCESSING OF VOICE AND VIDEO
(Course No. 451)

May 27-29

FUNDAMENTALS OF COMMUNICATION SATELLITE SYSTEMS
(Course No. 503)

June 8-12

**FEDERAL TELECOMMUNICATIONS POLICY: Its Impact on Domestic
and Worldwide Operations**
(Course No. 366)

June 16-19

**TELECOMMUNICATION STANDARDS IN THE US, UK, AND EEC:
Their Impact on Product Design and Marketing**
(Course No. 800)

June 17-19

**COMMUNICATIONS SATELLITE SYSTEMS—THE EARTH STATION:
A Practical Approach to Implementation**
(Course No. 823)

June 22-24

**SELECTING ORGANIZATIONAL
TELECOMMUNICATIONS SYSTEMS**
(Course No. 769)

June 24-26

**FUNDAMENTALS OF MARKETING FOR ENGINEERS,
SCIENTISTS, AND TECHNICAL MANAGERS**
(Course No. 804)

June 24-26

TECHNICAL EDUCATION IS NOT JUST AN EXPENSE: IT'S AN INVESTMENT.



CONTINUING ENGINEERING EDUCATION CALENDAR

The Calendar is published monthly to announce a select group of courses from the general schedule. These courses present both practical applications and underlying theory.

This issue of the Calendar is devoted selected courses in the field of telecommunications. The June 1981 issue of the Calendar will focus on information management.

To register for any of the following courses, please use the registration card on the last page of this publication.

Course No.	Title	Date	Second class postage is paid at Washington, D.C.
535	Digital Transmission Systems Engineering	May 11-15, 1981	Continuing Engineering Education CALENDAR
821	Digital Signal Detection and Estimation	May 18-22, 1981	May Issue
451	Digital Encoding and Processing of Voice and Video	May 27-29, 1981	Published monthly
503	Fundamentals of Communication Satellite Systems	June 8-12, 1981	Volume 3, No. 5
366	Federal Telecommunications Policy: Its Impact on Domestic and Worldwide Operations	June 16-19, 1981	Continuing Engineering Education
800	Telecommunication Standards in the US, UK, and EEC: Their Impact on Product Design and Marketing	June 17-19, 1981	George Washington University
823	Communications Satellite Systems—The Earth Station: A Practical Approach to Implementation	June 22-24, 1981	Washington, D.C. 20052
769	Selecting Organizational Telecommunications Systems	June 24-26, 1981	U.S.P.S. No. 444310
804	Fundamentals of Marketing for Engineers, Scientists, and Technical Managers	June 24-26, 1981	

Some additional courses are listed below. Brochures for these courses will be available three months before course presentation. Please use the form on the last page for registration or inquiry.

Course No.	Title	Month
671	Grounding, Bonding, and Shielding	May
588	Hazardous Electromagnetic Radiation	May
764	Quantitative Methods for Management Decision Making	May
463	Lightning Protection	June
696	Engineering of VLSI	June
672	Protocols for Packet Switching	June

Complete registration information may be found on the inside back cover.

UNIVERSITY POLICY ON EQUAL OPPORTUNITY

George Washington University does not discriminate against any person on the basis of race, color, religion, sex, national origin, age, handicap, or veteran status. This policy covers all programs, services, policies, and procedures of the University, including admission to educational programs and employment. The University is subject to the District of Columbia Human Rights Law.

Inquiries concerning the application of this policy and federal laws and regulations concerning discrimination in education or employment programs and activities may be addressed to Dr. Marianne Phelps, Assistant Provost for Affirmative Action, George Washington University, Rice Hall, Washington, D.C. 20052, or to the Assistant Secretary for Civil Rights of the Department of Education.

DIGITAL TRANSMISSION SYSTEMS ENGINEERING

Course No. 535

May 11-15, 1981

WHO SHOULD ATTEND

This course is designed for engineers, managers, and others who need a better working knowledge of the principles and the current and future applications of digital transmission systems engineering. The course will be of particular value to those who are currently planning transmission systems based on use of the rapidly growing digital technology.

DESCRIPTION

The course covers the numerous advantages of digital transmission, as compared to analog transmission, which have led to rapid and extensive changes in many practices associated with the engineering of communications system design.

PREREQUISITE

There is no prerequisite for this course. Although a degree in engineering or science would be helpful, the principles, techniques, and design practices will be presented so that participants without an extensive background in mathematics may gain a better understanding of the engineering applications of digital transmission systems.

OUTLINE

FIRST DAY

- Introduction to and comparison of analog and digital transmission systems. Applicable standards and hierarchies.
- Analog to digital conversion techniques: Pulse Code Modulation (PCM), Delta Modulation (DM), and CVSD; companding and multiplexing; equipment examples.

- Transmission media and effects: satellite, line-of-sight, troposcatter, HF, and cable. Sources of degradation in digital transmission.
- Performance allocations: user-to-user reference channels. Performance parameters: bit error rate, block error rate, error seconds, propagation outages, equipment unavailability, and bit count integrity.

SECOND DAY

- DTE/DCE interfaces: asynchronous, isochronous, synchronous.
- Time division multiplex design and performance: frame synchronization, pulse stuffing, transitional encoding.
- Baseband coding: NRZ, bipolar, diphase, partial response signaling. Cable systems with regenerative repeaters, adaptive equalization and clock recovery.
- Transmission over analog multiplex and radio systems: VF channel and group modems, baseband modems with FM radios, data under voice (DUV) and data above voice (DAV) modems; applicable modulation techniques and circuit conditioning.
- CCITT and U.S. standards: differences in multiplex and modem specifications.
- Monitoring and control: pseudo error, SNR and eye pattern. Control of diversity combining and redundancy switching. Automatic fault isolation and restoration.

THIRD DAY

- Transmission channel modeling: statistical concepts, propagation phenomenology.
- Line-of-sight transmission: Barnett-Vigants, Rice-Nagakami models. Fading; durations, rate, cumulative outages, frequency selectivity, and anomalous propagation on LOS paths.
- Tropospheric scatter and diffraction transmission: modeling of the fading dispersive channel; wide sense stationary with uncorrelated scattering; Rayleigh and lognormal fading, fading statistics.
- Satellite transmission: modeling channels, scintillation phenomena, meteorological effects.
- Digital transmission techniques: bit error rate, bandwidth efficiency, concept of the signal constellation, and comparison of AM, FSK, PSK, and AM-PM schemes in actual radio designs. Tradeoffs.

FOURTH DAY

- Optimum and practical receiver structures: conventional demodulators for LOS and satellite channels. Time gating, sequential decoding, tail cancellation, and adaptive feedback equalization for dispersive channels.
- Diversity operation: space, frequency, and polarization diversity, operation and performance. Combiner techniques; square law, maximal-ratio, and selection.
- Terrestrial radio link design: topography, path calculations-fade margin, system gain. Effects of co-channel and adjacent channel interferences, and of rain; dependence on operating frequency, cross-polarization.

- Mobile communications system design: cellular structure, TDMA, equipment constraints.
- Satellite communications system design: multiple access techniques, space segment/earth terminal tradeoffs.

FIFTH DAY

- Network timing and synchronization: time and frequency standards; independent clocks, master/slave, mutual synchronization, external reference, LORA C and Global Positioning System; buffering requirements.
- Testing for performance verification: bit error rate confidence levels, reliability, digital voice and digital data performance.
- Survey of U.S. and foreign digital transmission systems.
- Future considerations: advanced voice processing and multiplexing. Future transmission media: fiber optics, millimeter waveguide, short range mm radios, intersatellite communications.

INSTRUCTORS

David R. Smith is an electrical engineer with the Transmission System Engineering Division of the Defense Communications Engineering Center (DCEC), where his work involves analysis and systems design of digital transmission facilities for the Defense Communications System. His experience includes design and applications engineering for PCM and digital multiplex equipment, microwave radio and modem equipment, and network synchronization techniques. Dr. Smith has written several technical papers in the field of digital transmission systems.

John L. Osterholz is a communications system engineer with the Transmission System Engineering Division of DCEC. He is currently involved in the design and system analysis of terrestrial digital transmission equipment with emphasis on the effects of propagation and spectrum efficiency on multichannel digital communications. His experience includes design and analysis of digital signal processing for troposcatter system and link engineering criteria. Mr. Osterholz was previously involved in the design and analysis of telemetry systems for deep space applications. Prior to that, he was concerned with the effects of meteorology on the guidance requirements for tactical missile systems. Mr. Osterholz has published a number of papers in the field of communication channeling, modeling, propagation, and transmission system design.

FEE

The fee for the course is \$715. This includes lecture notes and supplies. Make checks and purchase orders payable to GWU, Continuing Engineering Education. Participants may delay payment until arrival. Parking is provided.

DIGITAL SIGNAL DETECTION AND ESTIMATION

May 18-22, 1981

WHO SHOULD ATTEND

This course is intended for communication engineers, industrial engineers, seismologists, geophysicists, and equipment designers who wish to acquire a thorough knowledge of the basics as well as of the most recent developments in the interdisciplinary field of signal processing, detection, and feature extinction.

DESCRIPTION

The course will cover fundamental theory for the extraction of signals from noisy observations and the estimation of signal parameters. Modern and efficient means for digital implementation of solutions, including Kalman filtering and other cost-effective methods, will be presented. A variety of applications will be discussed, including fault detection, seismic data processing, oil exploration, radar and sonar, plant control, and standard communications receiver design.

PREREQUISITE

There is no prerequisite for this course.

OUTLINE

Probability Theory Primer

- Random experiments, random variables, statistical distribution
- Moments, characteristic functions
- Conditional distributions and moments, independence

Random Sequences and Processes

- Autocorrelation, cross-correlation, and spectral density functions
- Markov processes
- Linear estimation models
- Emission processes

Linear Systems

- Models for multivariable systems
- Observability, controllability

Detection

- Fundamentals of decision theory
- Bayes, minimax, and Neyman-Pearson approaches
- Detection of known signals in noise
- Detection of random signals in noise
- Detection of signals with unknown parameters
- Fault detection, generalized likelihood ratio

Estimation

- Fundamental approaches (Bayesian, minimax, max likelihood)
- Parameters estimation
- Least-squares estimation
- Filters, smoothing, prediction

Kalman Filtering

- Sequential, recursive solutions
- Numerical properties

Other algorithms for implementation

- Square-root algorithms
- Partitionary algorithms
- Others

INSTRUCTORS

Nicholas Kyriakopoulos, D.Sc., Associate Professor of Engineering and Applied Science, GWU, has worked at Harry Diamond Laboratories and NASA/Goddard Space Flight Center. He was a Visiting Professor at the National Technical University, Athens, Greece, and has been a consultant to various federal agencies and private industry. His current interests include the use of computers in the analysis and design of networks, digital signal processing, estimation theory, and satellite communications.

Anthony Ephremides, Ph.D., is an Associate Professor of Electrical Engineering at the University of Maryland and a consultant to the Communication Sciences Division of the Naval Research Laboratory. He has been teaching and conducting research on various aspects of the theory and applications of communication systems since 1971. He has published numerous papers and edited two books. Currently his research interests lie in the area of computer communication networks.

FEE

The fee for the course is \$715. This includes lecture notes and supplies. Make checks and purchase orders payable to GWU, Continuing Engineering Education. Participants may delay payment until arrival. Parking is provided.

DIGITAL ENCODING AND PROCESSING OF VOICE AND VIDEO

Course No. 451

May 27-29, 1981

OBJECTIVES

The objective of this course is to provide the engineer working in the field of digital encoding of sources with a better understanding of the concepts and techniques employed, available systems, and future possibilities.

WHO SHOULD ATTEND

This course is structured to meet the needs of the communications engineer and supervisory-level engineer involved in digital encoding and processing of voice and video signals.

DESCRIPTION

Recent advances in semiconductor technology have resulted in high-speed logic, large semiconductor memories on a chip, and high-speed microprocessors using bipolar technology. These advances have resulted in development of techniques and systems for digitally encoding voice, graphic, and video signals, as well as the digital processing of these signals. Applications to telephony are discussed.

Topics include: a comparison of pulse code modulation (PCM), adaptive delta PCM, adaptive delta modulation (DM) systems, and linear predictive coding (LPC) to encode voice signals. Graphic and video encoding systems to be compared include PCM, DPCM, DM, and transform coders. Picture quality will be compared, and coded voice quality will be demonstrated.

PREREQUISITE

Although there is no prerequisite for the course, a degree in engineering would be helpful.

OUTLINE

- Introduction
 - Quantization
 - Coding (NRZ, RZ, BRZ)
 - Digital transmission
 - Categories of speech coders
 - Synchronization
 - Synchronous communication
 - Time division multiplexing
 - Digital multiplex hierarchies
- Time Domain Coders
 - Performance criteria
 - Pulse code modulation (PCM)
 - Dithering
 - Nonuniform quantization
 - Logarithmic quantizer
 - Adaptive quantization
 - Differential PCM (DPCM)
 - Adaptive differential PCM (ADPCM)
 - Delta modulation (DM)
 - Adaptive delta modulation (ADM)
 - Variable slope delta modulation (VSDM)

- Continuously variable slope DM (CVSDM)
- Delay encoding
- Nearly instantaneous companding
- Tree encoding
- Digitally controlled DM (DCDM)
- Comparison of techniques
- Transmission of non-speech signals
- Speech Coding Applications
 - Channel banks
 - Sampling theorem
 - Filter realizations
 - Framing
 - Signaling
 - Maintenance (monitoring)
 - Coding impairments
 - Circuit complexity
 - Transmission capabilities of commercial facilities
- Special Coding Techniques
 - Sub-band coders
 - Adaptive predictive coding (APC)
 - Vocoders
- Linear Predictive Coding (LPC)
 - Linear speech production model
 - Linear prediction model
 - Partial correlation (PARCOR)
 - Speech synthesis structures
 - LPC vocoder
 - Implementation algorithms
 - LPC performance
- Video Encoding
 - Source statistics
 - Receiver statistics
 - Video signal characteristics
 - Characteristics of the human visual system
 - PCM encoding of video
 - Differential PCM for video
 - Noise-feedback coder
 - Frequency-domain video encoders
 - Time-domain video encoders
 - Interframe coding

- Transform Picture Encoders
 - Picture structure
 - Transform coding
 - Linear transformations
 - Quantizing the coefficients
 - Factors affecting performance
 - Adaptive techniques
 - Picture complexity
 - Color TV encoding
 - Effect of bit errors in the coefficients
 - Comparison of coding methods
 - Hybrid coding of images

INSTRUCTOR

Bernhard E. Keiser is a consulting engineer in telecommunications and related fields. He holds a D.Sc.E.E. from Washington University in St. Louis, and is a Registered Professional Engineer in Virginia, Maryland, and the District of Columbia.

Dr. Keiser has performed studies of digital signal processors and holds two U.S. patents for voice signal bandwidth compression and expansion using time-domain principles. He has also worked in the areas of speech channel evaluation and low bit rate speech digitization.

Dr. Keiser is the author of 24 published papers and served in a number of advanced engineering and management positions in several major corporations prior to establishing his consulting engineering practice. He is a Fellow of the IEEE and Chairman of the Northern Virginia Section of the IEEE.

TEXT

Digital Processing of Speech Signals, by L. R. Rabiner and R. W. Schafer.

FEE

The fee for the course is \$575. This includes lecture notes, text, and supplies. Make checks and purchase orders payable to GWU, Continuing Engineering Education. Participants may delay payment until arrival. Parking is provided.

FUNDAMENTALS OF COMMUNICATION SATELLITE SYSTEMS

Course No. 503

June 8-12, 1981

WHO SHOULD ATTEND

This presentation is intended for engineers and managers whose organizations are investigating the use of or are in the process of converting to a satellite system. It will also be of interest to organizational planners who require a working knowledge of communication satellites for current and future job requirements.

DESCRIPTION AND OBJECTIVE

This course was designed in recognition of the increasing use of communication satellite systems in industry and government. It covers the principles, the theories, and the field of communication satellites, and is structured to provide participants with the background needed to understand the design and analysis of operational satellite systems.

PREREQUISITE

Although the course objectives will be accomplished with minimal use of advanced mathematics, some knowledge of communication theory or a degree in engineering or science is recommended.

OUTLINE

- Orbital Mechanics & Rockets
 - Kepler's Laws, orbital elements, launch systems
- Systems Concepts
 - performance criteria, noise temperature, antenna theory, system control
- Technology
 - space shuttle, LNRs, feeds, TWTs
- Spacecraft
 - electrical system, antennas and coverage, stabilization, transponders
- Earth Terminals
 - reflectors and pedestals, standard terminals, digital terminals, small terminals
- FM Systems
 - FDMA Equipment, FM Modems, Carson's Rule, connectivity
- Digital Systems
 - modems, coding/decoding, synchronization buffers
- Multiple Access
 - FDMA/FDM, TDMA/TDM, SCPC, D.A.
- Interference Analysis
 - inter-system, intra-system, radio regulations, noise budget

INSTRUCTOR

Willis DeHart is President of DeHart Consulting. He was employed by the Defense Communications Agency as a member of the engineering staff of the command and control center. His experience includes 15 years in the management of research, design, and development of communication satellites. Mr. DeHart has assisted the Office of Telecommunications Policy in frequency management as a member of national and international groups on subjects primarily related to communication satellites.

FEE

The fee for the course is \$715. This includes lecture notes and supplies. Make checks and purchase orders payable to GWU, Continuing Engineering Education. Participants may delay payment until arrival. Parking is provided.

Course No. 366

FEDERAL TELECOMMUNICATIONS POLICY: Its Impact on Domestic and Worldwide Operations

June 16-19, 1981

OBJECTIVE

This course offers a comprehensive analysis of the changing federal telecommunications policy as it applies to national and international telecommunications operations. Its purpose is to clarify current FCC decisions and policies, as well as their implications, and to interpret the direction telecommunications policy could take under the Reagan administration. This information should enable participants to plan and manage telecommunications activities at the local, interstate, and international levels.

WHO SHOULD ATTEND

- Industry executives
- Common carrier officials
- Strategic planners
- Marketing and R & D managers
- Technical staff directors
- Legislative analysts
- Technology assessors
- Lobbyists
- Counsels
- Regulatory officials
- Others with telecommunications responsibilities

BACKGROUND

Overall regulatory policy affecting the U.S. telecommunications industry is under reconsideration. More stress and reliance are being placed on competition rather than on regulation, and both houses of Congress are drafting bills that may substantially alter the present scheme of regulation and the conduct of business in the industry.

DESCRIPTION

FCC Policy Evolution

The evolution of current federal telecommunications policy will be traced and explained; the background against which the landmark FCC decisions were made will be developed as a basis for understanding this evolution; and the effect of changes in technology and demands on policy will be examined.

Major FCC Decisions

The major decisions of the FCC, which opened both the domestic and international services to competition, will be analyzed, and the technological and economic bases for these decisions will be described.

Emphasis will be placed on the consequences of these decisions with respect to quality, efficiency, diversity, and cost of service. The effects on users, as well as on existing and potential suppliers,

will also be considered. Special attention will be given to evolving federal policies and legislative proposals that could influence plant allocations and expenses, facility procurement, and cross-subsidization.

Policy Impact

The present and potential impact of Commission policies on intrastate operations will be considered in depth. Such consideration will center on the effects of: current and proposed actions on separations and divisions of tolls; local exchange rates; federal preemption on state jurisdiction; deregulation of terminal equipment on the cost and quality of local exchange service; and proposed changes in accounting and depreciation procedures vis-à-vis local exchange costs.

Proposed Legislation

Legislative proposals that could affect intrastate communications, in particular the bills designed to amend the Communications Act of 1934, will be discussed. The course will examine the potential of these proposals to modify state and local controls.

Common Carrier Services

Various new non- and quasi-common carrier services that bypass local exchanges will be assessed, particularly electronic mail, CATV, facsimile, and SBS. The relationship of these services to state and local authority will then be weighed.

Opportunities for the Future

This presentation will also address current and evolving policies regarding the new opportunities afforded American industry to provide facilities and equipment to markets worldwide. It will describe how open entry, when coupled with the deregulation of various services, will permit segments of the telecommunications industry, e.g., equipment manufacturers and software developers, to compete globally on the basis of quality and price. Present policy makes it difficult for these manufacturers to penetrate the overseas market. Also, the potential effects on current policy that may result from the new Reagan administration and Republican control of the Senate will be examined and evaluated.

Throughout the course, questions on issues of particular concern to participants will be encouraged.

PREREQUISITE

There is no prerequisite for this course.

OUTLINE

- Background
Policy to end of World War II

- Factors Causing Policy Change
 - Technological
 - Economic
 - Legislative
- Evolving Pro-competition Policy
 - Terminal equipment
 - Leased facilities
 - Satellite services
 - Switched services
- Regulatory Implications
 - Service pricing
 - Facility pricing
- Deregulation
 - Computer I
 - The legislative arena
 - Resale and shared use
 - Computer II—enhanced services
 - Resale of WATS and MTS
 - Status of dominant and other carriers
- Other Services
 - CATV
 - ECOM
 - SBS
- Federal Implications
 - Allocation of plant and equipment
 - Accounting
 - Depreciation
- Implications for States
 - Carterphone fallout
 - Federal pre-emption
 - Divisions and separations
 - ENFIA
 - Deregulation of terminal equipment
 - Current revenue requirements for:
 - Local exchange services
 - Potential services
- International Implications
 - Facility installation
 - Views of foreign administrations
 - Uniform standards
 - Pricing and services
- Other Implications for:
 - Existing carriers
 - Potential entrants
 - Manufacturers and suppliers
 - Users, business and residential

- The Future
 - Industry structure under free entry
 - Pricing structures
 - Service options
 - Prices and rates
 - Role of states
 - Role of FCC

INSTRUCTOR

Asher H. Ende is presently Counsel to Fly, Shuebruk, Blume, Gaguine, Boros and Schulkind. He is a member of the Bar of the U.S. Supreme Court, the State of New York, and the District of Columbia.

From 1974 to 1977, Mr. Ende was Executive Vice President, Strategy Development, RCA Global Communications, Inc., where he was responsible for long-range policy planning, particularly with respect to the effects of technological change on existing and emerging services. Prior to joining RCA, Mr. Ende served as Deputy Chief of the FCC's Common Carrier Bureau, Chief of its Office of Satellite Communications, and Director of the Special Task Force that conducted the FCC investigation into all facets of AT&T operations. In these positions, he had a major role in the formulation and implementation of major Commission policies in both the domestic and international fields.

Mr. Ende is also an expert in determination of a fair rate of return, proper capital structure, allowable rate base and expenses, proper rate structures, appropriate allocation of investment and expenses among different services over the same facilities, and the proper separation procedures to insure equitable divisions of telephone message revenues between interstate and intrastate jurisdictions.

Mr. Ende served as senior staff member and spokesman for the United States delegations to the conferences that negotiated the Interim and Definitive Intelsat Arrangements.

He is the author of numerous articles on telecommunications matters, including a chapter on "Administrative Reform and the Regulatory Process" in *Public Utility Regulation*.

FEE

The fee for the course is \$645. This includes lecture notes and supplies. Make checks and purchase orders payable to GWU, Continuing Engineering Education. Participants may delay payment until arrival. Parking is provided.

TELECOMMUNICATION STANDARDS IN THE US, UK, AND EEC Their Impact on Product Design and Marketing

Course No. 800

June 17-19, 1981

OBJECTIVE

The purpose of this course is to enable participants to identify American, Canadian, and Western European technical standards that impact on the design, development, installation, and evaluation of electronic equipment used in the telecommunication and teleprocessing industries. The knowledge gained should allow those responsible for telecommunication and teleprocessing product design, manufacturing, and marketing to tailor their products for compliance with standards set by various jurisdictions in the U.S. and other countries, to achieve better market penetration for their products, and to prevent costly mistakes.

WHO SHOULD ATTEND

Engineers, technical managers, marketing directors, lawyers, technical writers and publishers, network planners, technology assessors, strategic planners, industry executives, regulatory officials, representatives of foreign companies wishing to do business in the U.S., importers and exporters, consultants, and industry association executives.

BACKGROUND

Telecommunication product standards are fragmented and complex. Foreign and domestic manufacturers of telecommunication and teleprocessing products, hoping to sell them within the U.S.,

are faced with a voluntary standards system. Standards are developed on a voluntary basis by many organizations, yet industry compliance is not enforceable by law. Also, Bell and the independent telephone companies set their own technical criteria. Adding to this complexity is the requirement to comply with technical criteria established by the Rural Electrification Administration (REA) when selling products to REA-financed companies.

For manufacturers producing teleprocessing and telecommunication products in and/or marketing them to Canada and Western Europe, compliance with each nation's standards compounds the problem. Beyond the problem of standards is the question of product liability, a factor of vital concern to the industries' top management worldwide. This course is designed to clarify the difficulties of complying with a wide range of product standards and legal matters in these increasingly competitive industries.

DESCRIPTION

The course describes how standards are developed and examines specific standards that affect telecommunication products, such as VDE 0804, regulations for telecommunication apparatus in Germany, and C 22.4 No. 107, which sets limits and measurement methods for radio frequency interference from wire communication and signal systems in Canada.

Course content will include identification of organizations like EIA, TCTS, BSI, and VDE that will adhere to product conformance with these standards. The course focuses on the standards applicable to North America, the British Commonwealth, and the European Common Market countries.

In addition, attention will be devoted to criteria that can be used for selecting telecommunications products and for establishing comparative marketing data. The aspect of the "politics" of standards vis-à-vis organizational strategies and the relationship of future competition to product standards will also be examined. (Handout course material will include catalogs of standards.)

PREREQUISITE

Attendees should have some familiarity with technical and policy aspects of the telecommunication and teleprocessing industries.

OUTLINE

- Introduction and basic concepts
 - Evolution of standardization
 - National standardization bodies
 - Regional and international standardization bodies
 - Telecommunication standardization bodies
 - North American standardization—an overview
- Standards applicable to products for the American market
 - American National Standards Institute
 - Standards developed by trade associations such as EIA, NEMA, USITA
 - Standards developed by professional groups such as IEEE, ASQC, ISA
 - Standards developed by corporations such as AT&T
 - Electrical and building codes and their impact on telecommunication products
 - How to identify emerging standards that are not yet published

- Standards applicable to products for the Canadian market
 - Canadian Standards Association
 - Standards developed by trade associations such as TCTS, CCG, CITA
 - Standards developed by professional groups
 - Standards developed by corporations such as BNR and Bell Canada
 - Electrical and building codes and their impact on telecommunication products
 - How to identify emerging standards that are not yet published
- North American product liability considerations
 - Government mandates for safe product design
 - Product liability and the product manufacturer
 - Product liability and the product seller
 - Minimum safety standards
 - Where Underwriters Laboratories and Factory Mutual Research fit into the liability picture
 - Where UL Canada and CSA fit into the liability picture
- Standards applicable to British Commonwealth and former commonwealth countries
 - British Standards Institute
 - National certification bodies
 - General Post Office standards
- Standards applicable to the European Common Market
- Criteria for evaluating and selecting telecommunication products
 - Cost-benefit analysis
 - Current and future technical criteria
 - Changing technology
 - Telecommunications—automated office interface
- The politics of standards and organizational strategies for coping with standards diversity
- Competition in the Telecommunication and Teleprocessing Industries: Its impact on standards in the future

INSTRUCTOR

Jay F. Helms, P.E., is chairman of Helms and Associates, Consulting Engineers, Novato, California. Mr. Helms, a registered engineer in private practice, offers design and evaluation services to businesses and government agencies in the fields of telecommunications equipment and services offered by telephone companies. Mr. Helms has held engineering management positions with Ford Aerospace and Communications Corporation, Cal Tech's Jet Propulsion Laboratory, and the Bell Telephone System. While with Bell he established and operated an engineering laboratory that investigated a wide range of telecommunications products. He has published numerous national and international articles in professional and trade journals. His forthcoming book *Evaluating Telecommunication Products* will be published this year.

FEE

The fee for the course is \$575. This includes lecture notes and supplies. Make checks and purchase orders payable to GWU, Continuing Engineering Education. Participants may delay payment until arrival. Parking is provided.

COMMUNICATIONS SATELLITE SYSTEMS— THE EARTH STATION

A Practical Approach to Implementation

June 22-24, 1981

OBJECTIVES

- Completion of this course will enable participants to:
 - Identify and analyze the functions and capabilities of all major earth station subsystems.
 - Determine tradeoffs of all major earth station subsystems

- Apply the information gained to:
 - develop earth station implementation plans
 - clear regulatory hurdles
 - select and prepare site locations
 - procure required equipment
 - monitor construction activities

Course No. 823

- design and evaluate equipment installation and test procedures

WHO SHOULD ATTEND

This course is designed for engineers, managers, and planners who need a functional understanding of communication satellite earth stations, their use in satellite communications networks, and the procedures required to establish an operational earth station.

BACKGROUND

The use of and reliance on satellites as a means for organizations and governmental entities to communicate nationally and globally is rising rapidly. This course was structured to keep pace with the advancing technologies found in communication satellite systems by addressing the growing requirement for knowledge that can be applied to the process of engineering, acquiring and implementing operational earth stations.

DESCRIPTION

This course is applications oriented. It will detail the procedures, analytical frameworks, and major criteria that are essential to insure the proper design, site selection, system configuration, and test methods for implementing an earth station as an operating component of a communication satellite system. Emphasis will be on operational efficiency and cost effectiveness and on how management can best meet organizational communications requirements.

PREREQUISITE

There is no prerequisite for this course.

OUTLINE

Fundamentals of SATCOM

- Nature of the problem
- Multiple access techniques
- Spacecraft architecture
- Earth station architecture
- Network considerations
- Capacity calculations
- Figure of merit

Earth station antennas

- Feeds
- Gain/efficiency
- Sidelobes/interference
- Tracking
- Pedestals

Radio frequency subsystems

- Low noise amplifiers

- Frequency converters
- Transmitters

Baseband equipment

- Modems
- Multiplexers
- Error correction coding
- User interconnect

Cost/Design tradeoffs

- Antennas
- Receivers
- Coding

Regulatory

- Frequency analysis/coordination
- Legal
- Local permits

Site development

- Site survey
- Construction

Communications equipment

- Procurement
- Installation
- Test

Control and monitor equipment

- Requirements
- Procurement and installation

INSTRUCTORS

Michael J. Downey is Communications Specialist, Implementation Branch, DCA. His more than 20 years of experience in satellite communications includes the operation and maintenance of earth stations for both DOD and COMSAT. Mr. Downey was also Director of Earth Station Operations and Implementation for American Satellite Corporation, where he was responsible for the construction, equipment procurement, installation, and testing of over 20 stations for a variety of applications.

Robert Sims, Ph.D., is Chief of the SATCOM System Development Branch of the Defense Communications Engineering Center, Reston, Virginia. He is responsible for performance specification and development cycle monitoring of the Defense Satellite Communications System (DSCS). He has been associated with the DSCS project since 1970. Dr. Sims was previously employed by Harris Corporation, Melbourne, Florida.

FEE

The fee for the course is \$575. This includes lecture notes and supplies. Make checks and purchase orders payable to GWU, Continuing Engineering Education. Participants may delay payment until arrival. Parking is provided.

SELECTING ORGANIZATIONAL TELECOMMUNICATIONS SYSTEMS Policy and Technology Guidelines for Decision Making

Course No. 769

June 24-26, 1981

OBJECTIVES

This course will provide participants with the knowledge and criteria they need to ask the right questions, evaluate the answers and other data more accurately, and make the right decisions regarding the selection of a telecommunications system that will best meet their organization's current and future communications requirements.

WHO SHOULD ATTEND

Technical and non-technical executives, managers, administrators, network planners, procurement specialists, and others from business, industry, and government who will either make recommendations to top management or make final decisions concerning the selection of their organization's telecommunications system.

BACKGROUND

Because of the growing impact telecommunications, data processing, and reliance on automation will have on all business activities and costs, it is essential that decision makers know the advantages and pitfalls involved in choosing a telecommunications system that best meets organizational needs.

In recent years, telecommunications has been transformed from a monopolistic or quasi-monopolistic status to one of open competition. Reflected in both the policies implemented by the Federal Communications Commission and the legislation being considered in the Congress, this change has created a flood of new technologies and different types of equipment for handling and processing telecommunications. In addition, more competitors now provide alternative means for long-distance telecommunications. Executives and telecommunication managers are thus confronted with many options when choosing an organizational telecommunication system. To make the best decision, these leaders require the tools for assessing the impact of current and pending policy and for comparing the various technological and transmission facilities available. This fact provides the rationale for this course.

DESCRIPTION

This course will describe how telecommunications policy has evolved and will explore its present and future implications for organizational decision makers. Further, it will discuss telecommunications technology, including an evaluation of alternative means of communication, and the characteristics of existing terminal equipment. Attention will then focus on an analysis of the capabilities and limitations of available telecommunications systems, together with the tradeoffs management must consider before making a final selection.

PREREQUISITE

There is no formal course prerequisite. Technical terminology will be explained as needed.

OUTLINE

PART I—POLICY

BACKGROUND

- Evolution of the telecommunications systems
- Formulation of early policy

EVOLUTION OF CURRENT POLICY

- The first steps toward competition
- Terminal equipment
- Interchange services
- Domestic satellites
- The first computer inquiry

CARRIER REACTION

- Economic—adjusting tariffs and prices
- Judicial—appeals to the courts
- Administrative

- Interconnection and customer access
- Reliance on local jurisdictions

- The legislative arena—the Bell Bill

IMPLEMENTATION OF CURRENT POLICY

- Interconnection—mandated and provided under tariff
- Registration program for terminal equipment
- Switched network competition—Execunet
- Payment for local interconnection—ENFIA

CROSS-SUBSIDIZATION

- The requirements for fully allocated pricing

ENHANCED COMPETITION

- Resale and shared use—leased services
- Resale and shared use—switched services

DEREGULATION

- Computer I and Computer II inquiries
- Option to refrain from regulation

LEGISLATION—PENDING BILLS

PART II—AVAILABLE OPTIONS

BASIC TRANSMISSION MEANS

- Coaxial cable, microwave, satellite, and lightwave systems

FORMS OF COMMUNICATION

- Voice, record, facsimile, data, various forms of television, and voice input systems

METHODS OF COMMUNICATION

- Switched public, private, packet switched, and other types of value added networks

TERMINAL EQUIPMENT OPTIONS

- Modems, protocol converters, enhanced telephone sets, computers, communications processors, PBXs, concentrators, and multiplexors

CARRIERS—PRESENT AND FUTURE

FACILITIES—SERVICES OFFERED AND COSTS

- Domestic services via terrestrial facilities
- Domestic services via satellite facilities
- International services
- Cable and optical fiber
- Enhanced satellite

CHARACTERISTICS AND TRADEOFFS

- Data rates and communication capacity
- Traffic considerations
- Transmission quality, including delay and echo considerations
- Network control
- Protocols and protocol conversion

PART III—ELEMENTS IN DECISION MAKING

BASIC CARRIER OFFERINGS

RESALE AND VALUE ADDED OFFERINGS

UNREGULATED OFFERINGS

REGULARITY, CONTINUITY, AND QUALITY OF SERVICES vs. COSTS

OPPORTUNITIES AND PITFALLS

TECHNICAL OPTIONS

- Determination of specific needs
- Basis for evaluating available choices
- Fitting the system to individual needs
- Leasing vs. buying
- Building block approach to accommodate future growth and change
- Importance of comparative evaluation in light of specific needs

THE OFFICE OF THE FUTURE AND THE TELECOMMUNICATIONS INTERFACE

- Office automation
- Business information systems
- Keeping an eye on the future in choosing the present

PART IV—RECAPITULATION

TECHNIQUES FOR EVALUATION IN LIGHT OF POLICY AND TECHNOLOGY

CHOICE OF SYSTEM IS AN EXECUTIVE RATHER THAN A TECHNOLOGICAL FUNCTION

INSTRUCTORS

Asher H. Ende (course coordinator) is presently counsel to Fly, Shuebruk, Blume, Gaguine, Boros and Schulkind. He is a member of the Bar of the U.S. Supreme Court, the State of New York, and the District of Columbia.

From 1974 to 1977, Mr. Ende was Executive Vice President, Strategy Development, RCA Global Communications, Inc., where he was responsible for long-range policy planning, particularly with respect to the effects of technological change on existing and emerging services. Prior to joining RCA, Mr. Ende served as Deputy Chief of the FCC's Common Carrier Bureau, Chief of its Office of Satellite Communications, and Director of the Special Task Force that conducted the FCC investigation into

all facets of AT&T operations. In these positions, he had a major role in the formulation and implementation of major Commission policies in both the domestic and international fields.

Mr. Ende served as senior staff member and spokesman for the United States delegations to the conferences that negotiated the Interim and Definitive Intelsat Arrangements. He is the author of numerous articles on telecommunications matters, including a chapter entitled "Administrative Reform and the Regulatory Process" in *Public Utility Regulation*.

Richard G. Gould has worked on communications and broadcasting satellite systems as a Senior Research Engineer at the Stanford Research Institute, at the Communications Satellite

Corporation, and while in government service with the OTP and FCC. He has 29 years of experience in the design and analysis of communications systems. He has been a member of the U.S. delegations to CCIR meetings and ITU Radio Conferences since 1966.

FEE

The fee for the course is \$575. This includes lecture notes and supplies. Make checks and purchase orders payable to GWU, Continuing Engineering Education. Participants may delay payment until arrival. Parking is provided.

FUNDAMENTALS OF MARKETING FOR ENGINEERS, SCIENTISTS, AND TECHNICAL MANAGERS

Course No. 804

June 24-26, 1981

OBJECTIVES

This course is designed to provide participants with the "real-world" tools to help them analyze problems and deal with sensitive interdepartmental relationships where marketing matters are concerned.

WHO SHOULD ATTEND

Technically trained personnel who have an interest in or need to understand the impact marketing makes on their jobs and their organizations. This knowledge is especially important for those who anticipate moving into more direct involvement in management decision making.

DESCRIPTION

By receiving a broad perspective on marketing throughout the course, engineers and scientists are exposed to the latest techniques and strategies used to: (a) enlarge existing markets, (b) launch new products, (c) extend the sales life of existing products, (d) reposition products, (e) identify shifting buying patterns, and (f) improve profitability through new market development.

SPECIAL FEATURE

A special workshop session is included during which attendees develop and evaluate an actual marketing plan and discover how to operate successfully in a marketing-oriented organization.

PREREQUISITE

There is no prerequisite for this course.

OUTLINE

- The marketing function and its role in company operations
- The technical manager's role in a marketing-oriented organization
- The marketing concept—What it is
- The marketing mix—What it is, how it works
- Marketing interrelationships within the organization
- Buying behavior—How and why people buy
- Marketing research—Market analysis and intelligence
- Product positioning and market segmentation
- Developing product life cycle strategies

- Formulating pricing strategies
- Marketing communications and advertising
- The distribution and selling system
- Developing a marketing plan
- Marketing strategies for the 1980s—A technical manager's perspective
- Administering the marketing function
- Leadership and personal growth in a corporation environment—A technical manager's perspective

INSTRUCTOR

Norton Paley is President and Chief Executive Officer of Alexander-Norton Publishers, Inc., New York, N.Y. He was previously Publisher of Professional Development Programs at John Wiley & Sons, where he originated the publishing program geared to the various continuing education markets. He established the Direct Response Marketing operation at Wiley in 1971 and has also managed their in-house advertising agency, product information, subsidiary rights, exhibits, and new product development for the direct marketing operation. Prior to joining Wiley he spent nearly 10 years at McGraw-Hill Book Co., first in marketing and later as sponsoring editor for a continuing education publishing program.

Mr. Paley is the author of 36 published articles on marketing management and marketing planning. He is co-author of the text accompanying this course, a contributor to the textbook *Perspectives in Marketing Management*, and a frequent speaker at the American Management Association courses on marketing management.

TEXT

Marketing for the Non-Marketing Executive by Elam and Paley, AMACOM.

FEE

The fee for the course is \$575. This includes lecture notes, text, and supplies. Make checks and purchase orders payable to GWU, Continuing Engineering Education. Participants may delay payment until arrival. Parking is provided.

HOUSING AND MEALS

Housing and meals are not provided. However, there is a wide variety of hotels, motels, and restaurants nearby. Since hotel accommodations may be difficult to obtain, reservations should be made as early as possible. If you have difficulty obtaining reservations, we will be happy to assist you.

TIME AND PLACE

Check-in will be at 8:15 a.m. on the first day in the 6th floor lobby of the University's Gelman Library, 2130 H St., N.W. (corner of 22nd and H), Washington, D.C. Classes will meet from 8:30 a.m. to 4:15 p.m. Parking is provided.

REGISTRATION

Tentative or final registration should be made as soon as practicable. Fill out and mail the attached registration form, or apply by letter, telephone, TELEX, or purchase order to Continuing Engineering Education Program, George Washington University, Washington, D.C. 20052, (202) 676-6106, the toll free number (800) 424-9773, or TELEX 64374 (International). To facilitate registration by telephone, please mention the alphabetical priority code immediately to the right of the registration panel.

CONTINUING EDUCATION UNITS (CEU)

Course participants will receive a Certificate of Completion indicating the number of Continuing Education Units (CEUs) awarded for the course. The CEU is a standard measurement for non-credit continuing education programs. One CEU is given for each 10 contact hours in the classroom.

TEAM DISCOUNTS

Organizations are encouraged to take advantage of fee reductions for multiple registrations for the same course. Discounts of 10% are allowed for three to four registrants, 15% for five to nine registrants, and 20% for ten or more registrants from the same organization.

SPECIAL COURSES

Most of our courses can be presented on an in-house contract basis. New courses can be developed based on the specific training needs of your organization. In either case, the cost per capita is substantially lower than advertised fees. We will be happy to provide you with additional information.

-----PLEASE RETURN ENTIRE PANEL-----

REGISTRATION/INQUIRY FORM

Name _____				A
First	Middle	Last		B
Title _____				C
Organization _____				
Address _____				
City _____		State _____	Zip _____	
Company Phone _____		Home Phone _____		

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Course No.	Title	Date
535	Digital Transmission Systems Engineering	May 11-15, 1981
821	Digital Signal Detection and Estimation	May 18-22, 1981
451	Digital Encoding and Processing of Voice and Video	May 27-29, 1981
503	Fundamentals of Communication Satellite Systems	June 8-12, 1981
366	Federal Telecommunications Policy	June 16-19, 1981
800	Telecommunication Standards in the US, UK, and EEC	June 17-19, 1981
823	Communications Satellite Systems—The Earth Station	June 22-24, 1981
769	Selecting Organizational Telecommunications Systems	June 24-26, 1981
804	Fundamentals of Marketing for Engineers, Scientists, and Technical Managers	June 24-26, 1981

To facilitate registration by telephone, please mention the alphabetical priority code immediately to the right of the registration panel.

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CALENDAR

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